think Cook's voyage of less importance in antarctic geography than Wilkes' voyage. He says: "If such extraordinary reasoning were to be allowed, one might say far more justly of the first transatlantic voyage: 'North America was not discovered,' a fact which would seem to rank the voyage of Columbus as of much less importance than the voyage of Cabot.'" But if Dr. Mill had compared the voyage of Columbus with the voyages of Columbus' predecessors, his simile would have been exact. A number of men sailed westward before Columbus, but their efforts produced no tangible result beyond showing that the ocean was a big space of water. But Columbus brought out the fact that there were great lands in the west, and for this he justly gets deserved credit. In the same way Cook only found ocean and ice round the South Pole, while Wilkes first discovered the existence of an Antarctic continent, and he, therefore, like Columbus, is entitled to the credit of the discovery.

Dr. Mill states that I have 'done a patriotic service, and also a service to science, in setting out the real achievements of Charles Wilkes,' and for this I beg to thank him. But he says I claim for Wilkes 'first discovery.' I have never claimed that Wilkes was the first to sight land in the Antarctic. On the contrary, I think it may have been Don Gabriel de Castiglio in 1603, or perhaps some entirely forgotten mariner whose possible discovery of West Antarctica before 1569 may have been the origin of the 'Golfo de S. Sebastiano' on the charts of Mercator and Ortelius. What I claim for Wilkes is that he was the first to discover land masses which were probably continental in their dimensions, and the first to announce to the world the existence of the probable South Polar continent. And every Antarctic discovery since the time of the American Exploring Expedition goes to show that Wilkes was correct.

Dr. Mill says that I am 'unjust to the memory of Sir James Clark Ross.' He does not specify how, but he apologizes for Ross as follows: 'We feel sure that Ross was not aware of Wilkes' orders dated 1838 at the time he wrote of the American and French expeditions.' Yet Ross had read Wilkes' 'Narrative,' for he quotes it repeatedly. Of the long and serious investigation I made of Sir J. C. Ross' charges against Wilkes—in which I stated that Ross paid no attention to the statements nor to the charts published by Wilkes, but quietly started a grievous error, and also that none of Wilkes' discoveries were disproved by Ross for the simple reason that Ross never was within sighting distance of any part of Wilkes Land—Dr. Mill does not say a word, and by his silence, therefore, he assents to my conclusions.

Edwin Swift Balch.

THE SPECIFIC HEAT OF MERCURY.

To the Editor of Science: May I direct attention to a corollary to the recently published work of Messrs. Barnes and Cook on the specific heat of mercury?* In these experiments a slender thread of mercury was heated by passing a current through it, and the results agree fairly well with other results obtained by previous experimenters who heated mercury in the ordinary way. The agreement might be still closer if the other results were as accurate as those of Messrs. Barnes and Cook. Petterson and Hedelius (quoted in the article referred to) failed to work accurately enough to detect the decrease of the specific heat with rise of temperature, and Regnault even thought the change to be in the opposite direction. As it is, the results agree well enough to show that, to about one part in 300, *the specific heat is not altered by the passage of a current.*

This fact, I think, can hardly be self-evident, and is worth an experimental proof. Specific heat is known to vary with temperature, *i. e.,* rapidity of agitation of the molecules, and experiments along this line may give us a clue to the nature of conduction, whether this takes place entirely through the intermeshed ether, or partly by a motion (twisting or otherwise) of the particles.

That the same is true for water as for mercury has been shown by the experiments

* *Physical Review,* February, 1903.

of Callendar with the same apparatus, described in the British Association 'Report' of the Toronto meeting, 1897. I have thought it worth while to test the same for solids. Carbon was the substance chosen, as being a conductor and as having the greatest known variability of specific heat with temperature and, therefore (presumably), with other disturbing factors. The method employed was to heat a fine carbon rod by a heavy current, and watch its expansion by means of an optical lever.

If a vessel containing a given quantity of water have its capacity suddenly altered by a bulging or a constriction of its sides, the result will be a change of level of the water. And if the specific heat of the carbon rod be suddenly altered when the current is started or stopped there should be observed a change of temperature which I hoped to detect by an abrupt alteration in the length of the rod. The results were entirely negative. The rod used was of French make, a Carré electric light carbon, 51 cm. long and 0.15 cm. diameter, wrapped in tissue paper and enclosed in a glass tube. Its resistance (cold), according to the nature of the contact made, was from about eleven ohms upwards. The rod was mounted vertically, its lower end resting in a mercury cup, and its upper end tilting a small lever on a knife-edge bearing. On this lever was mounted a galvanometer mirror. The current was taken from the upper end of the rod by a wire wrapped tightly around it. The tilting of the mirror was read by means of a telescope and a vertical scale placed two and one half meters away. The current used was three amperes. When the current was started or stopped a perfectly steady motion of the scale was observed. A jolt of 0.05 cm. in the field of the telescope could have been detected.

As about 6 cm. of the scale passed the cross wires before the still damp mucilage holding the tissue paper around the carbon began to steam, it will be seen that a jolt of 0.05 cm. would have meant a change in temperature of about two thirds of a degree, taking the initial temperature of the carbon as 20°, or 293° absolute. And a difference of level of two thirds of a degree in 293° would have meant an alteration in the heat capacity of about one part in 450.

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THE PROPOSED BIOLOGICAL LABORATORY AT THE TORTUGAS.

TO THE EDITOR OF SCIENCE: In SCIENCE, June 12, 1903, is a letter by Professor C. B. Davenport upon the proposed biological station at the Tortugas. There are two sentences in it which I feel it necessary to comment upon. The first is: 'On the Pacific coast we have the Hopkins laboratory and that of the University of California.' The second is: 'While we are planning a chain of marine stations certainly * * * Puget Sound should be considered.' No doubt Dr. Davenport, who is quite familiar with the fact that the Minnesota Seaside Station at Port Renfrew, British Columbia, is just entering upon the third year of not altogether unsuccessful effort, means by 'we' the biologists of the United States. Under this construction it is altogether proper for him to omit the Minnesota Seaside Station from his calculations. In view of the fact, however, that this station, although upon Canadian soil, from which a number of memoirs and one volume of the yearbook, *Postelsia,* have already been published, is managed in connection with one of the American universities and has drawn its clientele principally from the western United States, it seems proper that it should be included as one of the Pacific coast stations of America. Its position on the Straits of Fuca was selected with great care so that it might be accessible as a center for the study of the fauna and flora not only of the sound but also of the open sea.

The Minnesota Seaside Station has not passed through the stage of an extended discussion in the columns of SCIENCE, nor has it intimated its pressing wants to Mr. Carnegie or any other millionaire. It has risen quite peacefully and modestly upon a cooperative basis which is none the less favorable for respectable work. Every year has seen considerable improvement both in its buildings and